NTSB National Transportation Safety Board

Federal Most Wanted Transportation Safety Improvements

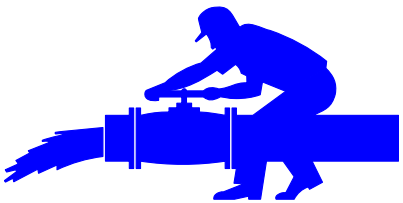
"… a program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives."

November 14, 2006

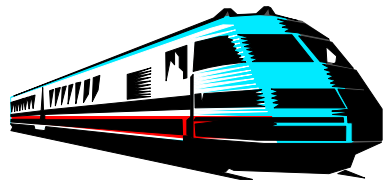
Safety Recommendations

Issued Since 1967
TOTAL = 12,536

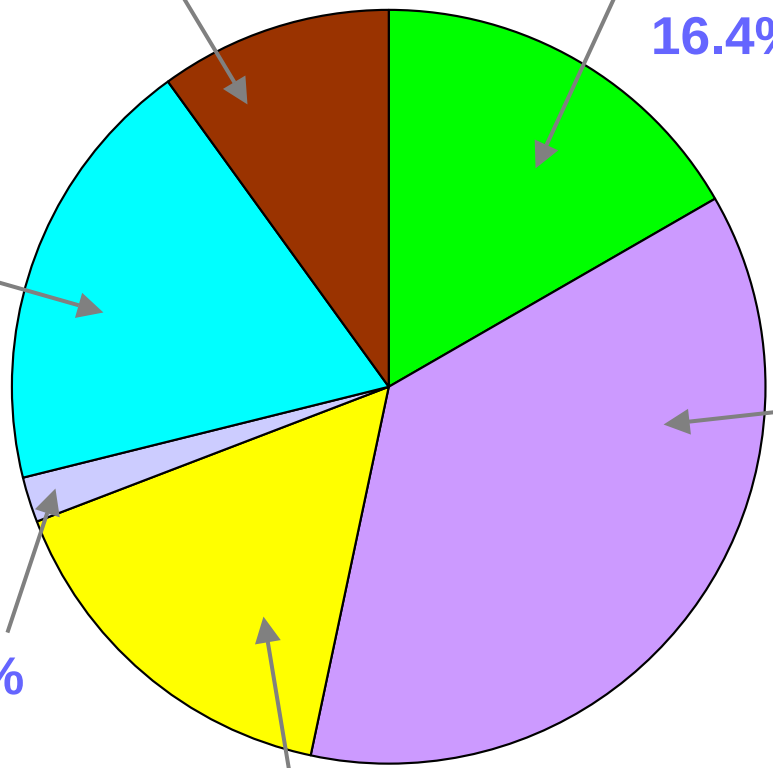
Pipeline 1225 9.8%



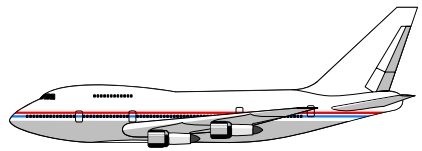
Railroad 2053
16.4%



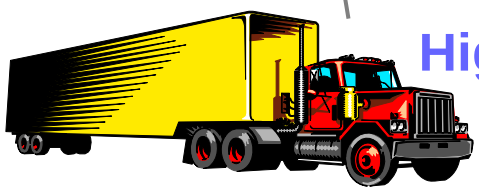
Marine 2307
18.4%



Aviation
4653 37.1%



Intermodal 229 1.8%



Highway 2069 16.5%

November 2006

NTSB MOST WANTED
Transportation Safety Improvements

866 Open Recommendations

- Aviation: 373
- Highway: 258
- Railroad: 106
- Marine: 77
- Pipeline: 32
- Intermodal: 19

November 2006

NTSB MOST WANTED
Transportation Safety Improvements

Issue areas selected for intensive follow-up and heightened awareness because they:

- Will impact and enhance safety of the nation’s transportation system
- Have a high level of public visibility and interest
- Will benefit from special form of encouragement

NTSB MOST WANTED
Transportation Safety Improvements

47 Safety Recommendations on Most Wanted List

Federal Recommendations: 38

DOT Secretary	1	PHMSA	1
FAA	20	FRA	1
FMCSA	9	USCG	2
NHTSA	4		

State Recommendations: 9

November 2006

NTSB MOST WANTED
Transportation Safety Improvements

Office of Safety Recommendations & Advocacy

Darrin Broadwater
Mike Brown
Pat Cariseo
Barbara Grider
Jeff Marcus
Julie Perrot
Alan Pollock
Pat Sullivan

NTSB MOST WANTED
Transportation Safety Improvements

Today's Presenters

Sandy Rowlett
Bob Swain
Nora Marshall
Dan Bower
Jim Cash
Jana Price
Jim Southworth
Jack Spencer
Bruce Magladry
Mitch Garber

Action / Timeliness Criteria

Red: Unacceptable response

Yellow: Acceptable response – progressing slowly

Green: Acceptable response – progressing in a timely manner

NTSB MOST WANTED
Transportation Safety Improvements

Aviation
- Stop Runway Incursions/Ground Collisions of Aircraft
- Eliminate Flammable Fuel/Air Vapors in Fuel Tanks on Transport Category Aircraft
- Reduce Dangers to Aircraft Flying in Icing Conditions
- Require Restraint Systems for Children Under Age 2
- Improve Audio and Data Recorders/Require Video Recorders
- Reduce Accidents and Incidents Caused by Human Fatigue

Pipeline
- Reduce Accidents and Incidents Caused by Human Fatigue

Rail
- Implement Positive Train Control

Marine
- Improve Drug and Alcohol Testing of Crews After Accidents
- Reduce Accidents and Incidents Caused by Human Fatigue

Highway
- Improve the Safety of Motor Carrier Operations
- Prevent Medically-Unqualified Drivers from Operating Commercial Vehicles
- Enhance Protection for Bus Passengers

U.S. DOT
- Reduce Accidents and Incidents Caused by Human Fatigue

NTSB MOST WANTED
Transportation Safety Improvements

Stop Runway Incursions and Ground Collisions of Aircraft

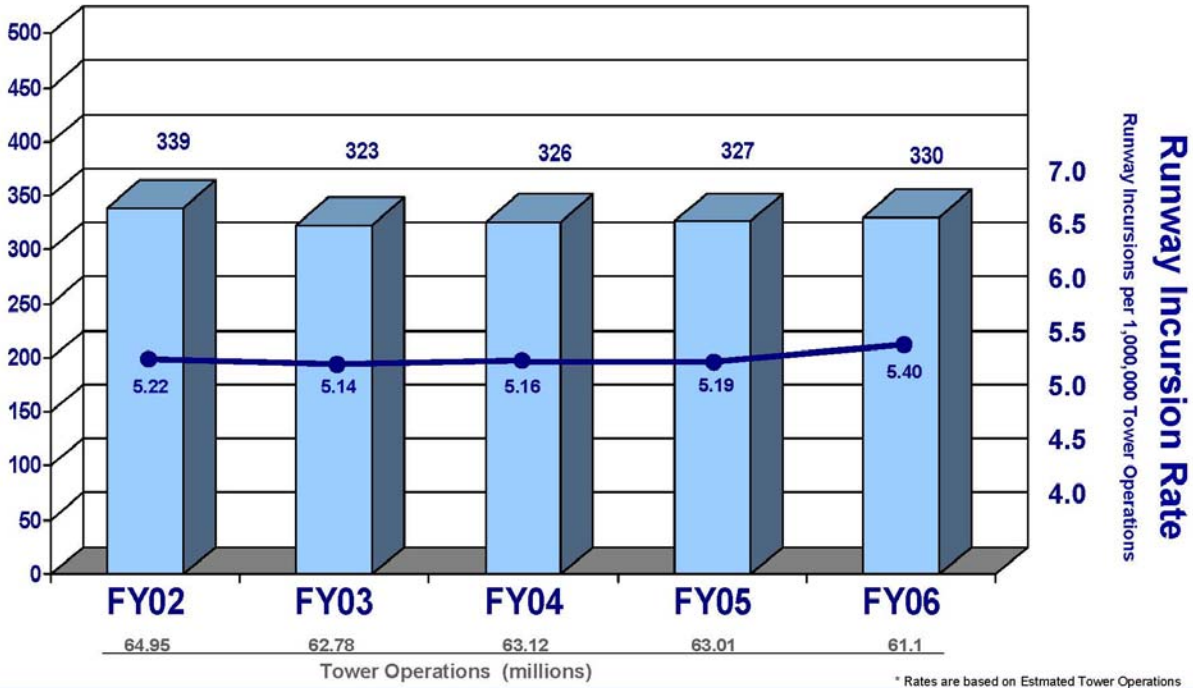
Safety Improvements Wanted

- Develop ground movement safety systems that will provide direct warning to flight crews in the cockpit

A-00-66

RUNWAY INCURSIONS

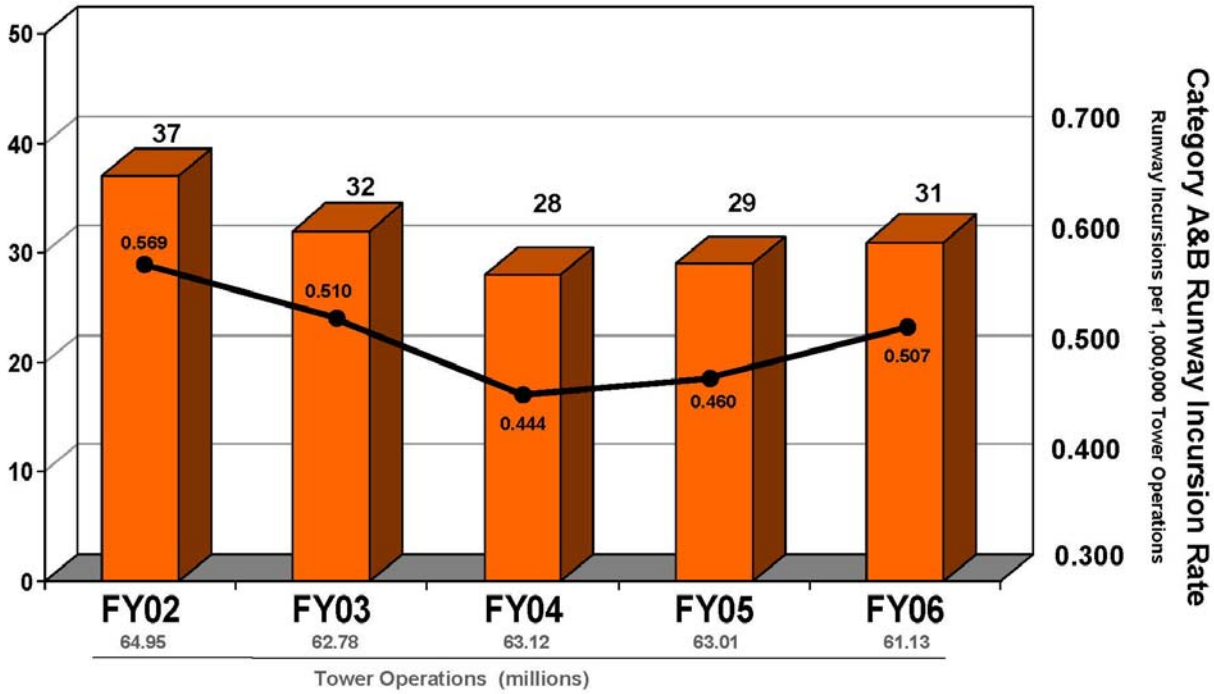
All Categories



* Rates are based on Estmated Tower Operations

Runway Incursions

Category A&B



* Rates are based on Estmated Tower Operations

NTSB MOST WANTED
Transportation Safety Improvements

NTSB MOST WANTED
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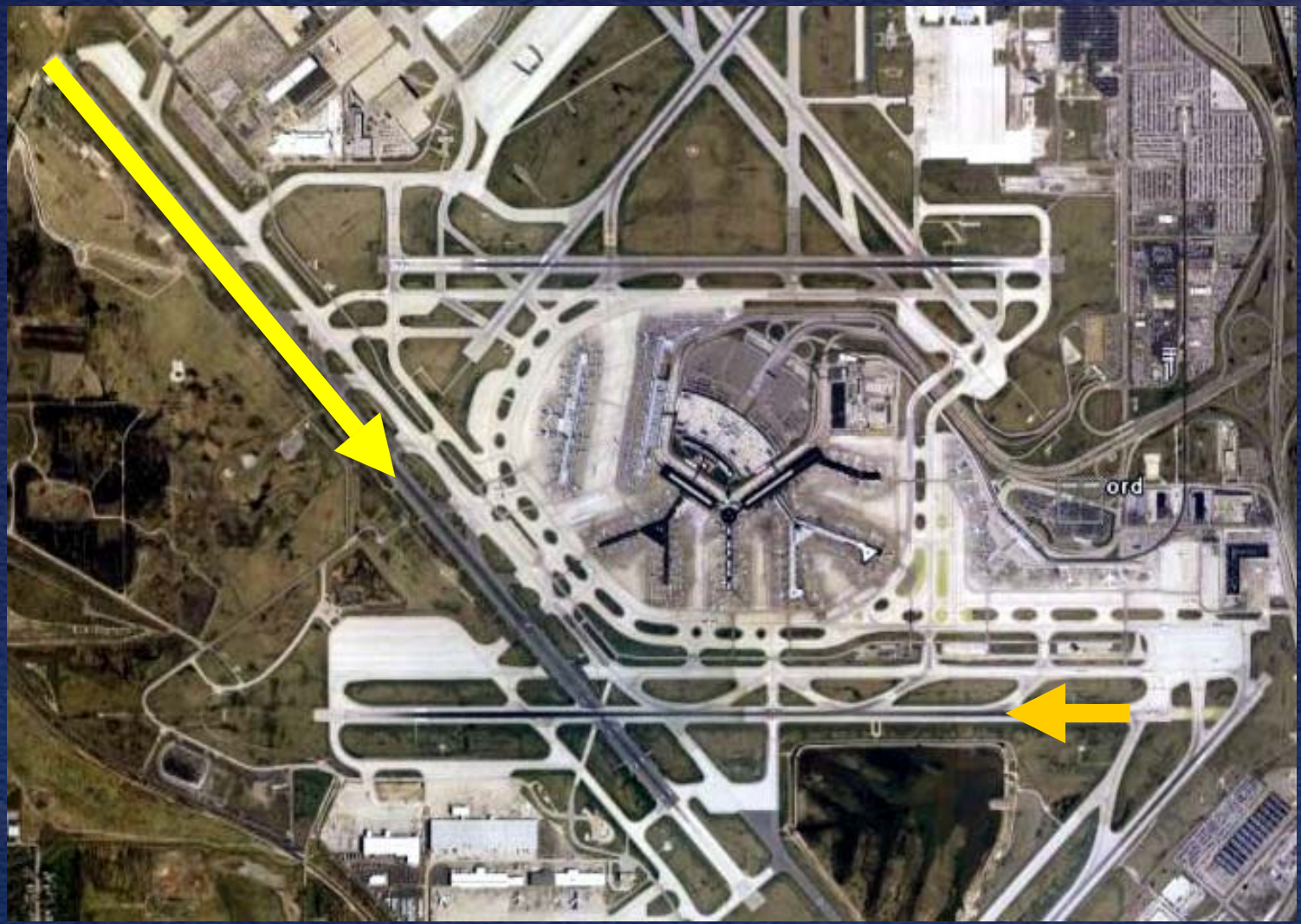
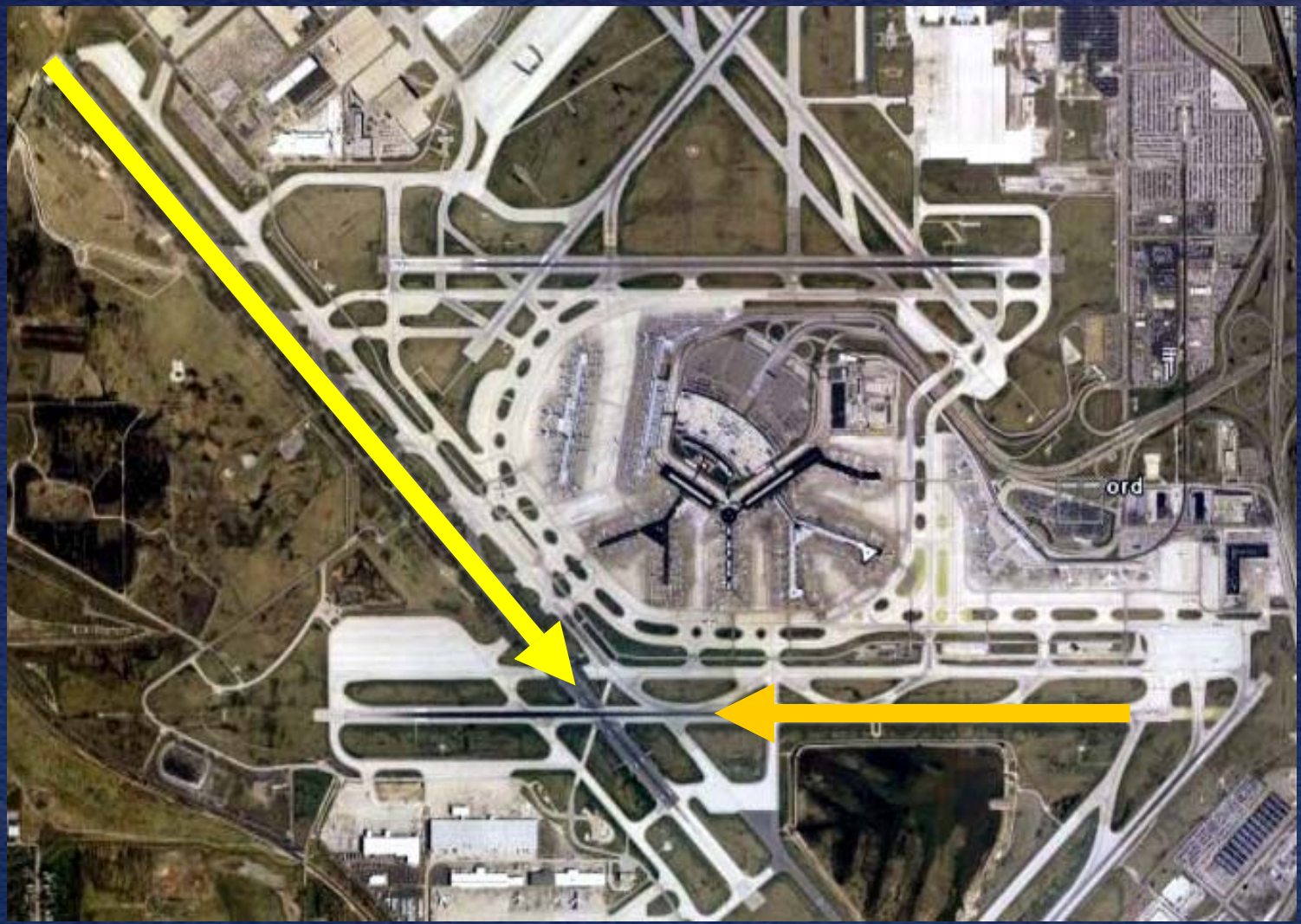
Transportation Safety Improvements



NTSB MOST WANTED
Transportation Safety Improvements



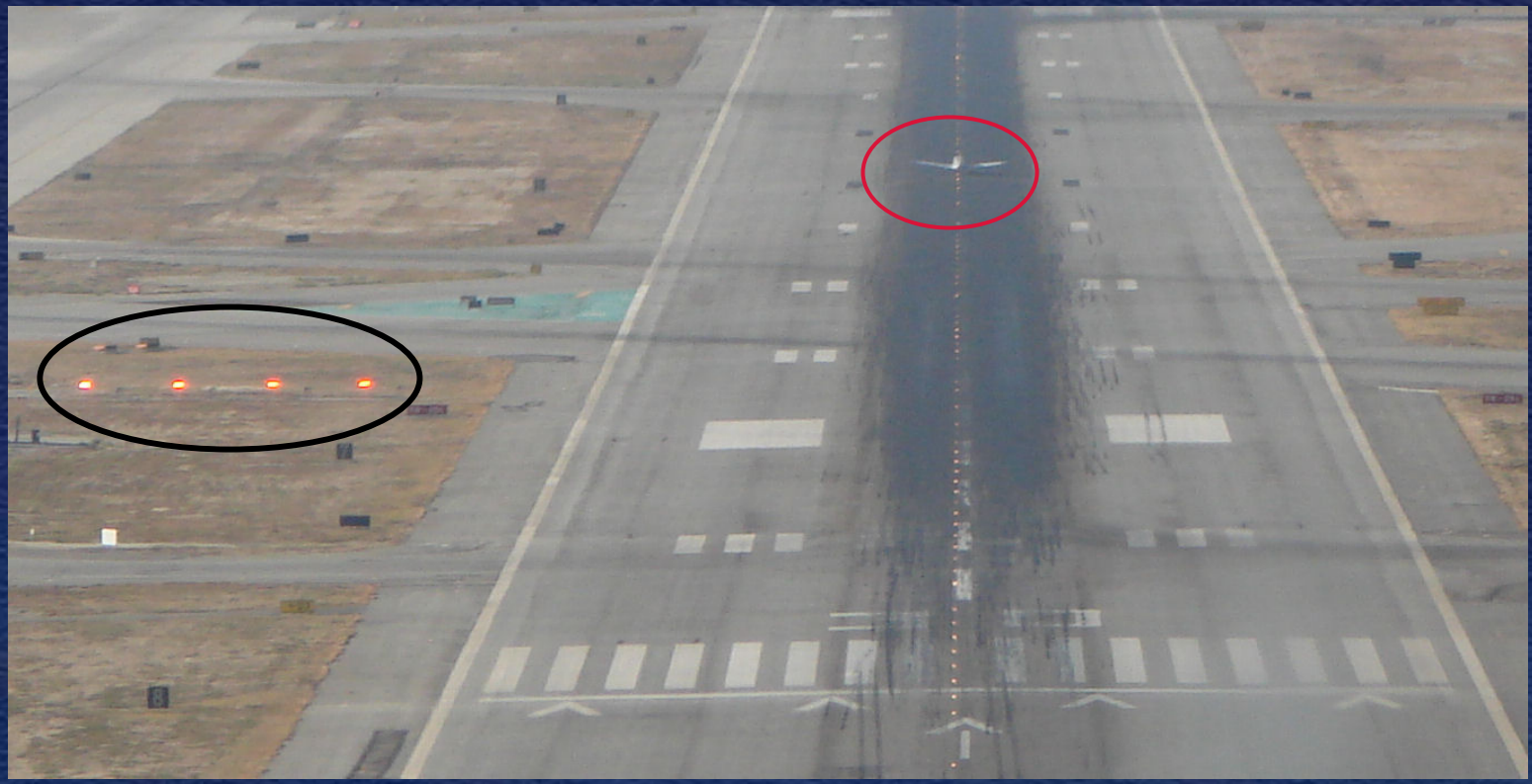
NTSB MOST WANTED
Transportation Safety Improvements

NTSB MOST WANTED
Transportation Safety Improvements

NTSB MOST WANTED
Transportation Safety Improvements

FAA Actions

Final Approach Runway Occupancy Signal



NTSB MOST WANTED
Transportation Safety Improvements

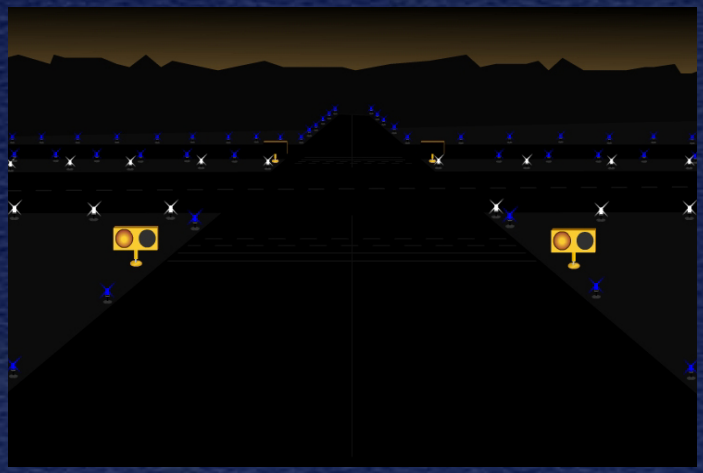
Runway Status Lights

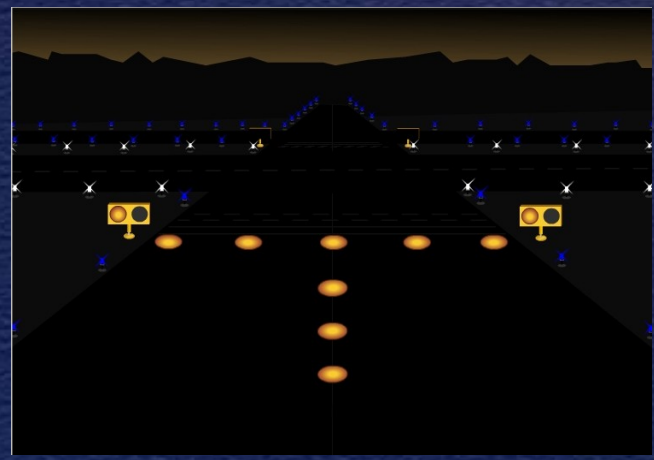
NTSB MOST WANTED
Transportation Safety Improvements

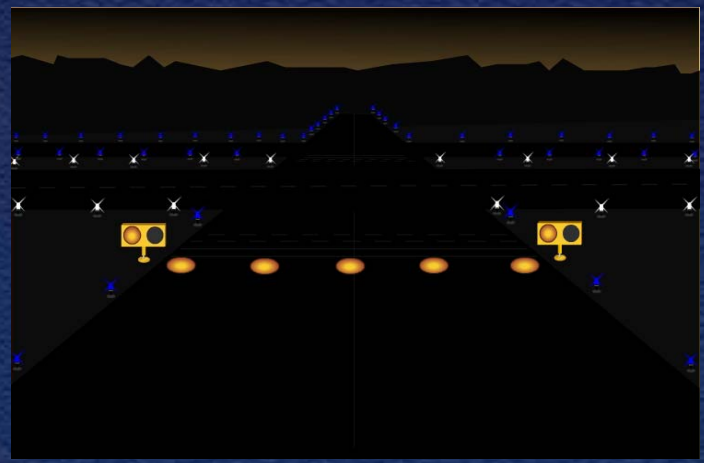
Enhanced Airport Lighting Program

NTSB MOST WANTED
Transportation Safety Improvements

Enhanced Airport Lighting Program







NTSB MOST WANTED
Transportation Safety Improvements

Stop Runway Incursions and Ground Collisions of Aircraft

Proposed Safety Board Action

- Keep issue area on Most Wanted List
- Retain red classification: Unacceptable response

Timeliness Classification	RED

NTSB MOST WANTED
Transportation Safety Improvements

Eliminate Flammable Fuel / Air Vapors in Transport Category Aircraft

Safety Improvements Wanted

…preclude the operation of transport-category airplanes with explosive fuel/air mixtures in the fuel tanks:

- Develop airplane design modifications such as nitrogen-inerting systems and insulation between heat-generating equipment and fuel tanks **A-96-174**
- Modify operations to reduce the potential for fuel-air mixtures in the fuel tanks that will preclude explosive fuel-air mixtures in the fuel tank **A-96-175 (Closed - Unacceptable)**

NTSB MOST WANTED
Transportation Safety Improvements

Fuel Tank Explosions

TWA 747, July 1996


PAL 737, May 1990


Avianca 727, November 1989

346 fatalities total

Widespread Problem

- Affects multiple airplane manufacturers
- Recent for Airbus fuel pumps:
  - Airworthiness Directive 2006-12-02

NTSB MOST WANTED
Transportation Safety Improvements

Fuel tank explosions since TWA 800

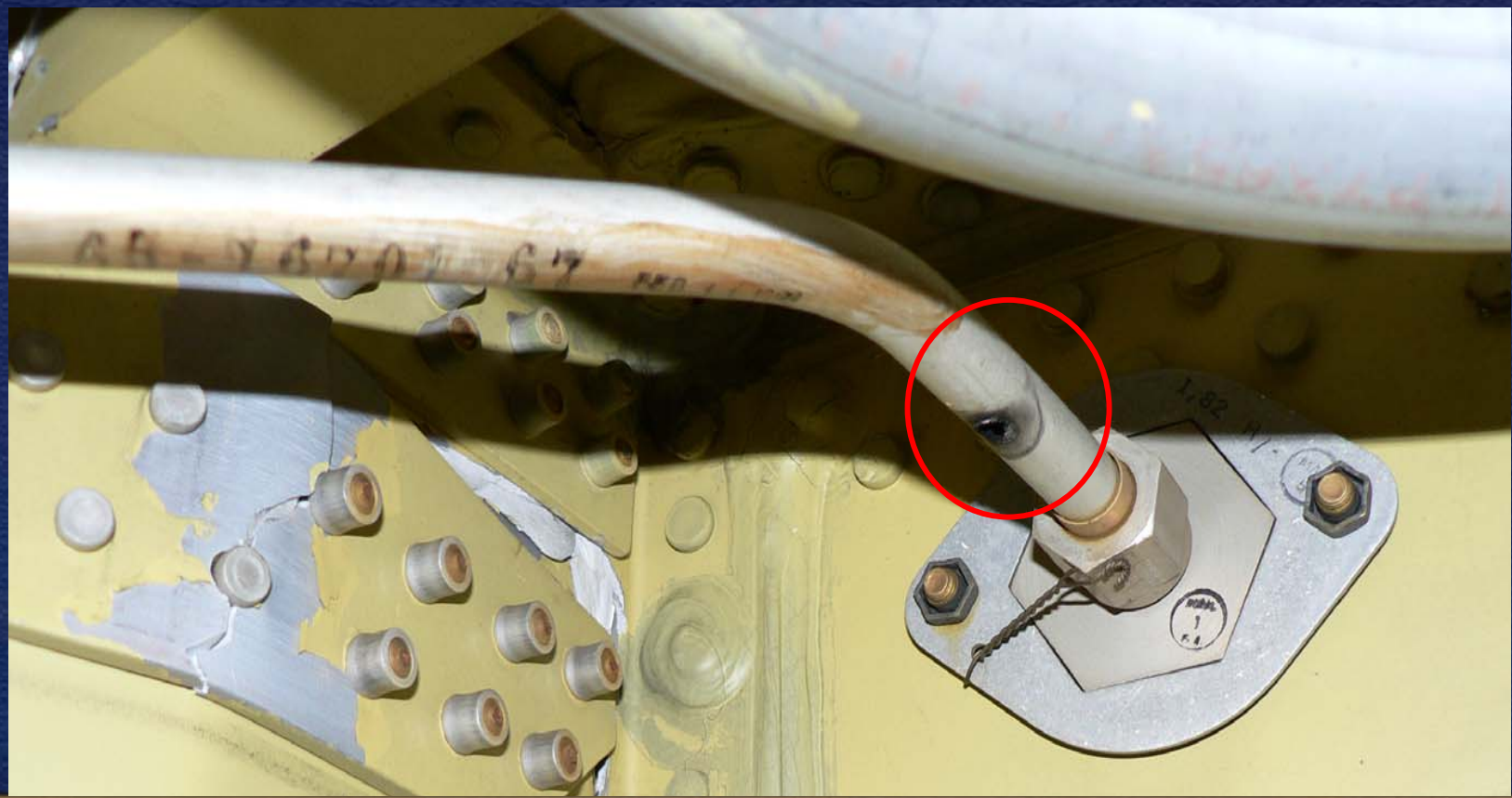
Thai Airways, March 2001

Transall C160R, May 2004

Transmile, May 2006

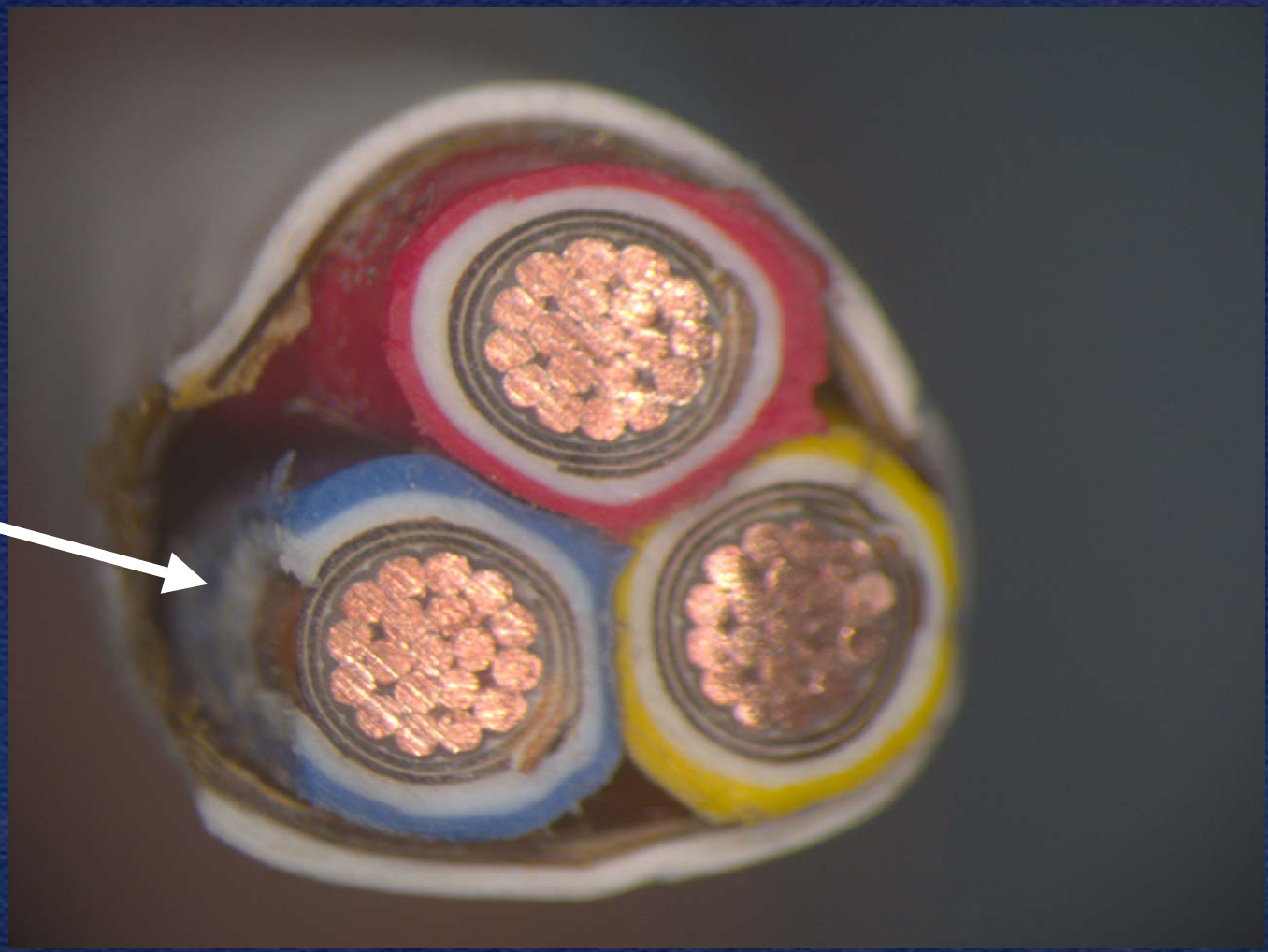
NTSB MOST WANTED
Transportation Safety Improvements

Inside of the left wing fuel tank, a hole burned through the fuel pump conduit, exposing power wires to the fuel vapor

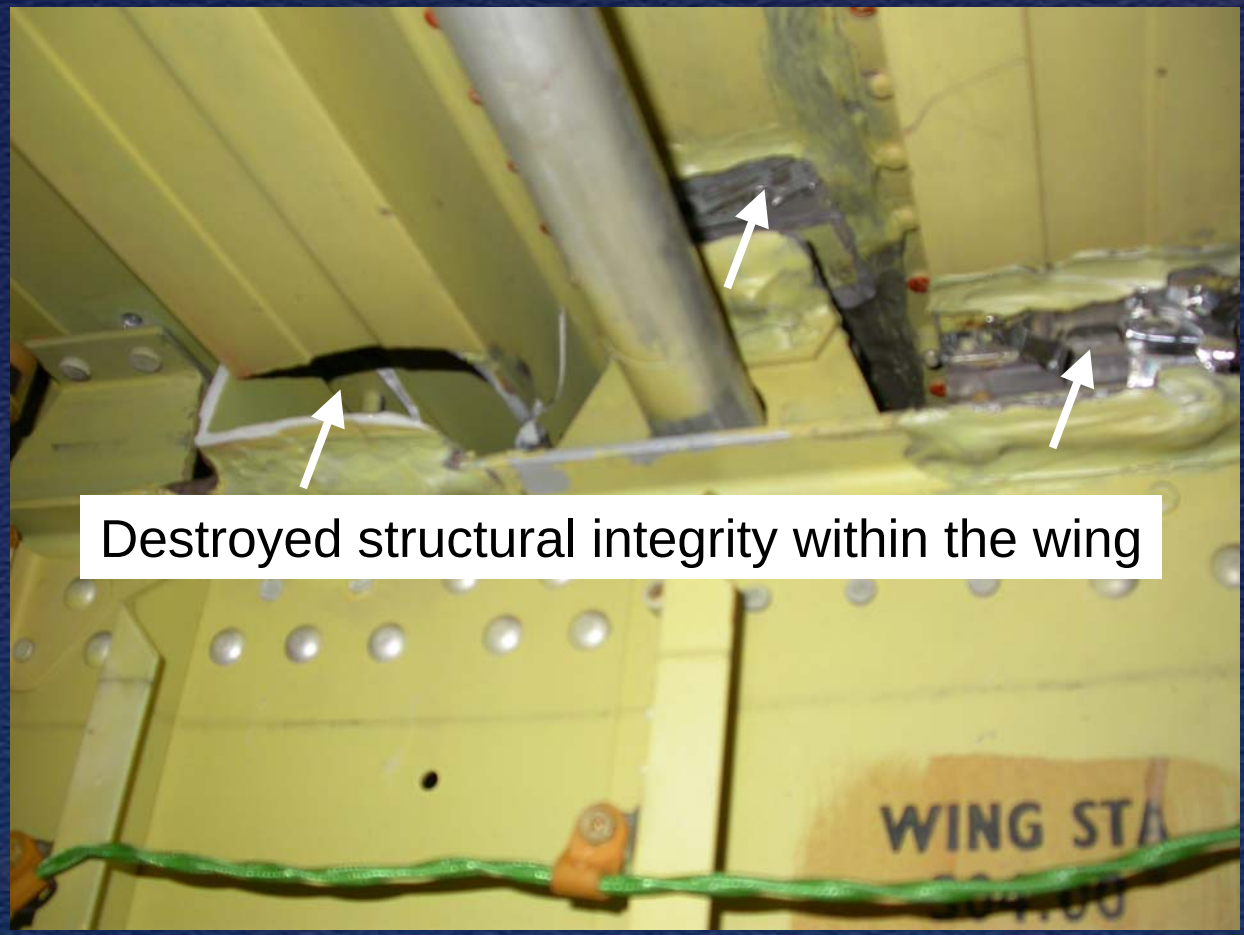


NTSB MOST WANTED
Transportation Safety Improvements

Chafed fuel pump wires from a domestic airliner were also found during Transmile investigation



Wing fuel tanks are also at risk
FAA NPRM only cites heated center wing fuel tanks



Transmile Airlines, B-727, May 4, 2006

FAA Proposed NPRM:

- Issued on November 23, 2005
- Affects over 3,200 retrofit and new large passenger jets
- Cost estimates vary, typically between $100,000 - $250,000 per airplane

FAA NPRM Focus

- FAA and industry focus on center fuselage tanks
- Wing tanks are also at risk, but not addressed in NPRM

Current Use, New Airplanes, R&D

Current:

- Military use of nitrogen in fuel tanks is common
- Nitrogen systems in a limited number of Boeing airplanes
- No protective nitrogen systems on Airbus airplanes

Future:

- 787 wing and fuselage tanks protected
- Research on nitrogen-based fire suppression systems

NTSB MOST WANTED
Transportation Safety Improvements

Eliminate Flammable Fuel/Air Vapors in Fuel Tanks

Proposed Safety Board Actions

- Keep the issue area on Most Wanted List
- Retain yellow designation:

  Acceptable response – progressing slowly

Timeliness Classification	YELLOW

NTSB MOST WANTED
Transportation Safety Improvements

Require Restraint Systems for Children Under Age 2

Safety Improvement Wanted

- Require all occupants be restrained during takeoff, landing and turbulence, and require infants and small children be restrained appropriately for their size
  A-95-51

NTSB Board Meeting August 2004

- Child restraint issue discussed in depth
- Board voted to keep issue on Most Wanted List
- Classified recommendation as ‘unacceptable response’

FAA Response

- FAA withdrew rulemaking on child restraints, August 2005
- FAA told NTSB it will *not* require use of child restraints, October 2005

NTSB MOST WANTED
Transportation Safety Improvements

Reduce Dangers to Aircraft Flying in Icing Conditions

NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

- Research into effects of in-flight icing, including freezing rain and critical ice shapes **A-98-92**
- Upgrade aircraft certification standards and operational procedures **A-96-54, A-96-56, A-98-100**

Recent Recommendations

- 11 recommendations and 1 safety alert related to icing in past two years
- Approach is a case-by-case basis

NTSB MOST WANTED
Transportation Safety Improvements

Cessna 208B Caravan

- Single-engine turboprop airplane
- Several icing-related fatal accidents in last 6 years
- 4 recommendations issued in December 2004

NTSB MOST WANTED
Transportation Safety Improvements

Cessna 208 – Moscow November 19, 2005

- 8 fatal in accident on approach
- FDR equipped
- Resulted in 3 urgent recommendations
  - 120 knots minimum airspeed
  - Prohibit flight in icing conditions worse than light icing
  - Disengage autopilot in icing conditions
- All adopted by FAA

NTSB MOST WANTED
Transportation Safety Improvements

Saab 340B January 2, 2006

Loss of Control Incident

- Departed controlled flight in icing conditions
- Lost 5,000 feet altitude
- Nearly inverted

NTSB MOST WANTED
Transportation Safety Improvements

Saab 340B January 2, 2006

- Resulted in 4 urgent recommendations
  - Minimum airspeed
  - Modify stall protection
  - Ice detection
  - Disengage autopilot in icing conditions
- FAA working with Saab and EASA to determine response
- FAA issued Safety Alert for operators

NTSB MOST WANTED
Transportation Safety Improvements

Under Investigation:
Cessna 560
Pueblo, CO February 16, 2005

- 8 fatalities
- Crashed on approach
- Atmospheric conditions conducive to icing
- Ice accretion was discussed on CVR
- Board meeting early next year

NTSB MOST WANTED
Transportation Safety Improvements

Bombardier Challenger CL-600

Montrose, CO November 29, 2004

- 3 fatalities, 3 seriously injured
- Crashed during takeoff
- Flight crew failed to ensure the wings were free of ice or snow contamination accumulated while on ground
- Board issued alert to pilots regarding ground icing

Recent Recommendations

- In the past two years:
  - 11 recommendations
  - 1 alert related to icing
- Recent recommendations address aircraft on case-by-case basis
- Most Wanted List addresses all airplanes

FAA Recent Actions

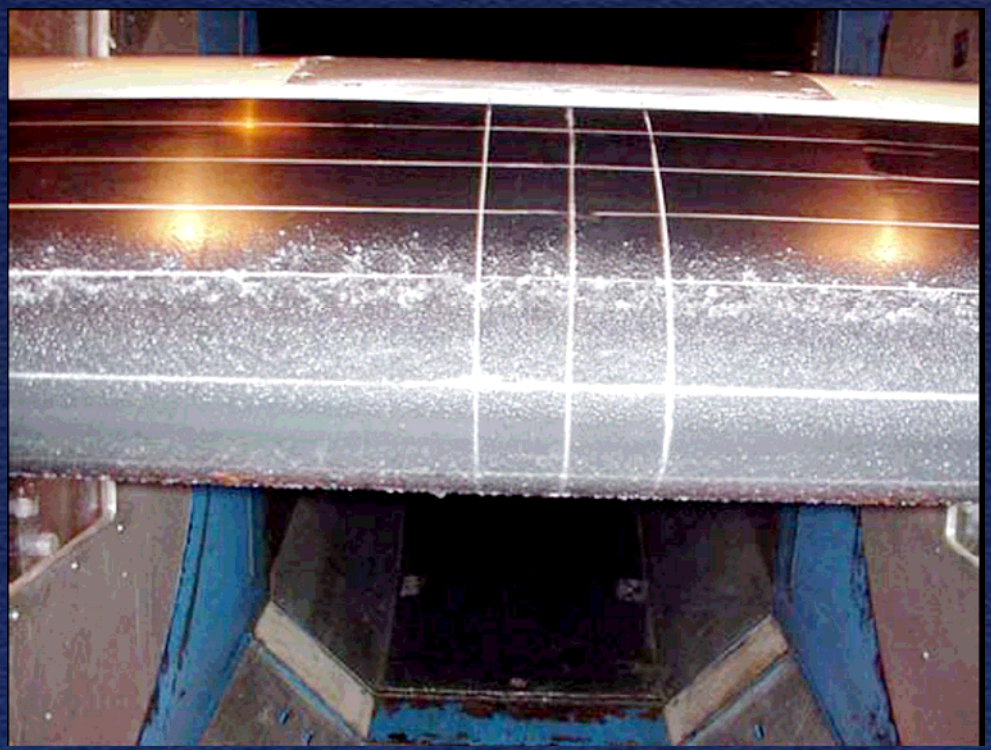
- FAA issued NPRM

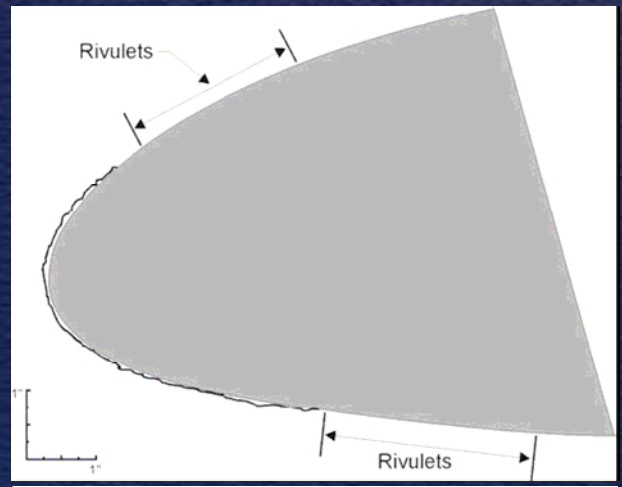
Airplane Performance and Handling Characteristics in Icing Conditions

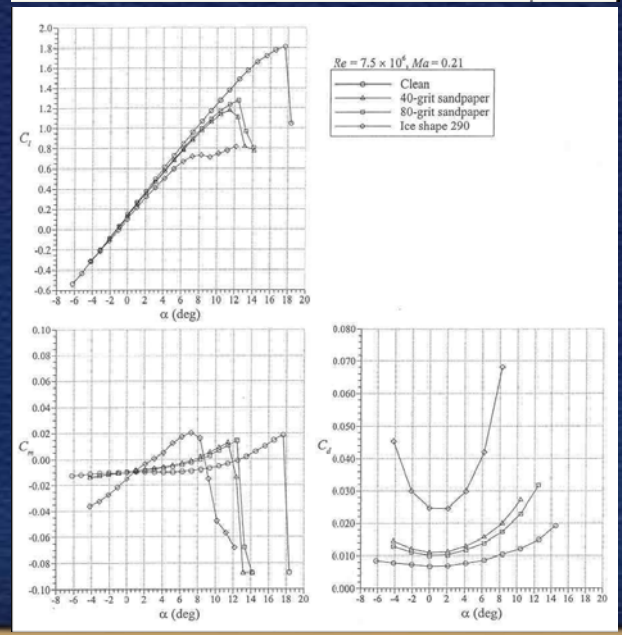
- Results of research sponsored by FAA and NASA (as requested in A-98-92) are currently included in Appendix R of Advisory Circular 20-73A

NTSB MOST WANTED
Transportation Safety Improvements

FAA - Recent Actions AC20-73A







FAA Recent Actions and Limitations

- Also issued a proposed Advisory Circular (AC25.21-1X) to provide methods to meet requirements of NPRM
- Both actions partially satisfy the intent of A-98-92
- Need to ensure full range of Appendix C, including large droplets, are included in determining shapes to be used in testing
- Will only apply to newly certificated airplanes

NTSB MOST WANTED
Transportation Safety Improvements

Reduce Dangers to Aircraft Flying in Icing Conditions

Proposed Safety Board Action

- Keep issue area on Most Wanted List
- Retain red designation: Unacceptable response

Timeliness Classification	RED

NTSB MOST WANTED
Transportation Safety Improvements

Improve Aviation Audio and Data Recorders and Require Cockpit Video Recorders

NTSB MOST WANTED

Transportation Safety Improvements

- Retrofit 30 minutes to 2-hour CVRs
- 10-minute backup power
- Dual redundant CVR/FDR
- 737 additional parameters
- Cockpit image recorders

NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

Accident Recorder Improvements

- 2-hour cockpit voice recorder with battery back-up power **A-99-16**
- Dual combination recorders **A-99-17**
- Reliable aircraft electrical power **A-99-18**

FAA Activity

- **FDR Enhancement NPRM February 2005**
  - Retrofit 2-Hour CVR
  - Partial recorder independent power supply
  - No mandatory dual redundant CVR/FDR requirement
- **FAA continues to review comments**
- **Final rule expected May 2007**

NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

Additional Boeing 737 Flight Data Recorder Parameters

- Upgrades for 737 series aircraft

A-99-28 and 29

NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

Cockpit Image Recorders

- Adopt technical standard for image recorder **A-99-59**
- Require image recorder in all Part 121/135 turbine aircraft not previously equipped with recorders **A-03-64**
- 2-hour cockpit image recorder in larger transport category aircraft **A-00-30 and 31**

Video Recorder Update

- Technical Standard Order issued July 2006
- FAA-NTSB-Industry follow on flight test
- MD helicopter image recorder

NTSB MOST WANTED
Transportation Safety Improvements

Improve Audio and Data Recorders Require Cockpit Image Recorders

Proposed Safety Board Action

- Keep issue area on Most Wanted List
- Retain red designation: Unacceptable response

Timeliness Classification	RED

NTSB MOST WANTED
Transportation Safety Improvements

Reduce Accidents and Incidents Caused by Human Fatigue

1989 DOT Fatigue Recommendations

- **I-89-1:** Research – Closed Acceptable
- **I-89-2:** Education – Closed Acceptable
- **I-89-3:** Hours of Service Regulations – Closed Superseded

Safety Improvements Wanted

- Establish scientifically-based hours-of-service rules that set limits on work hours, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements
  I-99-1

- Modal recommendations to FRA, FMCSA, FAA, USCG, and PHMSA

Aviation (Flight Crew)

- **A-94-194, A-95-113, A-06-10**
- Flight and duty time limits set in 1938 and 1958
- FAA issued NPRM in 1995 to update flight/duty time regulations – but no rule issued

Aviation (Maintenance)

- **A-97-71**
- FAA has conducted research on fatigue in maintenance, but no rulemaking proposed

Proposed Safety Board Action Aviation

- Reclassify A-94-194 and A-95-113 ‘Closed – Unacceptable’
- Keep issue area on Most Wanted List
- Assign red timeliness designation: Unacceptable response

Timeliness Classification	RED

Marine

- **M-99-1**
- Work-hour limitations date to early 1900s
- International Maritime Organization amended regulations in 1995
- Coast Guard and Maritime Transportation Act
  - Crew Endurance Management demonstration project

NTSB MOST WANTED
Transportation Safety Improvements

Proposed Safety Board Action
Marine

- Keep issue area on Most Wanted List
- Assign yellow timeliness designation:
  Acceptable response - progressing slowly

Timeliness Classification	YELLOW

Pipeline

- **P-98-30, P-99-12**
- No Federal hours-of-service regulations exist for controllers of pipeline systems
- PHMSA Advisory Bulletin
- Public workshop on control room operations

Proposed Safety Board Action Pipeline

- Keep issue area on Most Wanted List
- Assign yellow timeliness designation: Acceptable response – progressing slowly

Timeliness Classification	YELLOW

Department of Transportation

- **I-99-1**
- Require modal administrations to establish scientifically-based hours-of-service regulations
- DOT Human Factors Coordinating Committee Operator Fatigue Management (OFM) Program
- 2006 Safety Board recommendation to incorporate information similar to OFM in pilot training programs

Proposed Safety Board Action U.S. DOT

- Keep issue area on Most Wanted List
- Assign yellow timeliness designation: Acceptable response – progressing slowly

Timeliness Classification	YELLOW

NTSB MOST WANTED
Transportation Safety Improvements

Implement Positive Train Control Systems

Safety Improvements Wanted

- Facilitate development and implementation of positive train control systems that include collision avoidance, and
- Require implementation of positive train control on main line tracks, giving priority to high-risk corridors where commuter and intercity passenger railroads operate **R-01-6**

Human Factors Causes

- Fatigue
- Sleep apnea
- Medication
- Reduced visibility
- Distractions

Train Accidents

FRA reported accidents for 2005

- 203 head-on, rear-end, and side collisions
- 183 or 90% attributed to human factor causes

Accidents Under Investigation

- Lincoln, AL
- Anding, MS
- Chicago, IL
- Abington, PA

FRA Action

- Final rule, effective June 2005, establishes standards for the development and use of processor-based signal and train control systems

Positive Train Control Projects

Amtrak

- 430 miles installed on Northeast Corridor
- 45 miles installed on Michigan Line

New Jersey Transit

- 23 miles of 540 miles installed

North American Joint Positive Train Control Project

- 120 miles being installed between Chicago and St. Louis

Positive Train Control Projects

Union Pacific Railroad

- 333 miles in signaled territory
- 140 miles in dark territory

Alaska Railroad

- 611 miles under development

Positive Train Control Projects

BNSF Railway

- Centralia - Beardstown, IL
  135 miles
- Dallas / Fort Worth - Oklahoma City
  167 miles

Norfolk Southern Railway

- Charleston - Columbia, SC
  122 miles

PTC Projects

- **Amtrak –** Advanced Civil Speed Enforcement System, Incremental Train Control System
- **New Jersey Transit** – Advanced Civil Speed Enforcement
- **Union Pacific –** Communication Based Train Management
- **Alaska Railroad** – Collision Avoidance System
- **BNSF Railway** – Electronic Train Management System
- **Norfolk Southern Railway** – Optimized Train Control

NTSB MOST WANTED
Transportation Safety Improvements

Implement Positive Train Control Systems

Proposed Safety Board Action

- Keep issue area on Most Wanted List
- Retain yellow designation:

  Acceptable response – progressing slowly

Timeliness Classification	YELLOW

NTSB MOST WANTED
Transportation Safety Improvements

Improve Drug and Alcohol Testing of Crews After Accidents

Safety Improvements Wanted

- Clear post-accident collecting and testing procedures, responsibilities and time limits, and abstinence from alcohol
  M-98-71, M-98-73, M-98-76, M-98-77, M-98-79, M-98-81
- Task force to evaluate deficiencies in post- accident testing and implement program based on ‘lessons learned’
  M-98-72
- Breath and urine-testing devices on foreign ships in U.S. waters and U.S. oceangoing ships
  M-98-75

NTSB Special Investigation Report

Alcohol and Drug Testing

- 1998 report cited 28 major marine accidents since *Exxon Valdez*
- Identified shortcomings in post-accident testing process

Congressional Action

- **1998** Federal law requires the establishment of procedures to ensure post-accident alcohol testing within 2 hours, unless prevented by concerns for safety directly related to accident

Coast Guard Action

- **2003** Notice of proposed rulemaking on chemical testing following serious marine incidents
- **2005** Final rule published December 22, 2005

Current Status

- 7 out of 8 recommendations closed with acceptable classifications
- M-98-76 remains open with unacceptable classification

NTSB MOST WANTED
Transportation Safety Improvements

Improve Drug and Alcohol Testing of Crews After Accidents

Proposed Safety Board Action

- Remove Safety Recommendation M-98-76 from Most Wanted list
- Remove issue area from Most Wanted List

NTSB MOST WANTED
Transportation Safety Improvements

Improve the Safety of Motor Carrier Operations

Safety Improvements Wanted

- Change the way safety fitness ratings are determined so adverse vehicle and driver performance alone are sufficient to result in an overall unsatisfactory rating for the carrier **H-99-6**

Truck Fitness Safety Ratings

Safety Fitness Factors

- General
- Drivers
- Operations
- Vehicles
- Hazardous Materials
- Accidents

Truck Fitness Safety Ratings

Accident Factors

- General
- **Drivers**
- Operations
- **Vehicles**
- Hazardous Materials
- Accidents

FMCSA Actions

- Under Comprehensive Safety Analysis 2010, developing new performance-based operational model
- Pilot testing of new rating system in fiscal year 2008
- Continue to develop standards to measure overall safety of motor carrier operations

NTSB MOST WANTED
Transportation Safety Improvements

Improve the Safety of Motor Carrier Operations

Proposed Safety Board Action

- Keep issue area on Most Wanted List
- Assign red designation: Unacceptable response

Timeliness Classification	RED

NTSB MOST WANTED
Transportation Safety Improvements

Prevent Medically Unqualified Drivers from Operating Commercial Vehicles

NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

Develop comprehensive medical oversight program that addresses:

- Examiner qualifications
- Adequacy of regulations
- Non-regulatory guidance
- Review process
- Tracking mechanisms
- Enforcement and Reporting

H-01-17 thru H-01-24

FMCSA Actions

- Establishment of Medical Review Board
- Survey for development of National Registry of Certified Medical Examiners
- NPRM to merge CDL/medical certificates – publication expected November 15, 2006

FMCSA Actions Remaining

- Only progress on H-01-19 (regulatory update)
- No measurable progress on other recommendations
- Current initiatives may be responsive

NTSB MOST WANTED
Transportation Safety Improvements

Prevent Medically Unqualified Drivers from Operating Commercial Vehicles

Proposed Safety Board Action

- Reclassify H-01-17 and -20 ‘Open – Unacceptable’
- Keep issue area on Most Wanted List
- Change to red designation: Unacceptable response

Timeliness Classification	RED

NTSB MOST WANTED
Transportation Safety Improvements

Enhance Protection for Bus Passengers

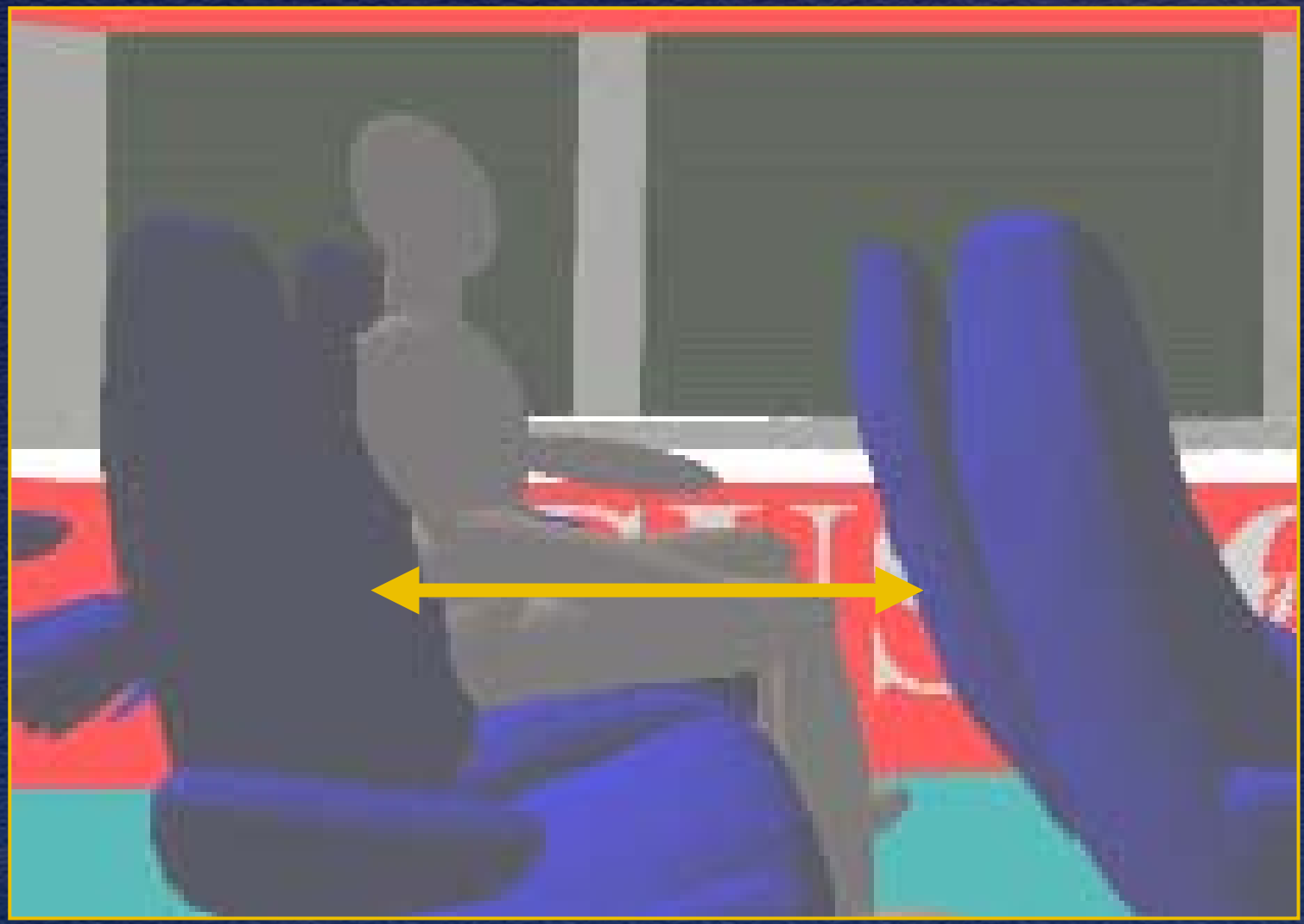
NTSB MOST WANTED
Transportation Safety Improvements

Safety Improvements Wanted

- Roof strength requirements to provide maximum survival space **H-99-50**
- Easy opening window and roof exits that stay open during evacuations **H-99-9**
- Occupant protection systems during impacts and rollovers **H-99-47**
- Standard definitions for bus body types **H-99-43**

NTSB MOST WANTED

Transportation Safety Improvements



NTSB MOST WANTED
Transportation Safety Improvements

New Orleans
May 1999

1999: Recommendations issued

NHTSA Actions

2002: No NHTSA-Industry consensus on vehicle safety standards

2004-2006: NHTSA – Transport Canada window related research conducted

2006: NHTSA review of FMVSS 217

2005-2008: NHTSA bus data collection mechanism devised

NTSB MOST WANTED
Transportation Safety Improvements

Enhance Protection for Bus Passengers

Proposed Safety Board Action

- Reclassify H-99-43 ‘Open – Acceptable Alternate’ and remove from Most Wanted List
- Keep issue area on Most Wanted List
- Retain yellow designation: Acceptable response – progressing slowly

Timeliness Classification	YELLOW

NTSB MOST WANTED
Transportation Safety Improvements

Most Wanted List
Federal Issues

Vote to adopt full report